Comemt ID	Commen t Text	Comment Response	location of primary response
VAC1	Gina is actually the RQAM. The QA Chemists reviewing QAPPs have delegated authority to approve the plan for her, so I sign in her place.	Noted and included in revision, see pg	1
VAC2	Please reference the WCD QAPP here with a citation as well. (I do see one below in 1.1)	Noted and included in revision, see pg	4
VAC3	Are matrix spikes going to be conducted at a rate of 5% for the project (similar to the WCD project)?	Groundwater samples are expected to be dilute and not likely subject to significant matrix effects during annalysis. However, this will be testesd during the first sampling event specifcally in samples with large specific conductance values.	13
NU4	Also, what is the frequency for these replicate and duplicate samples? 5%?	About 5 % each. Total of all QA samples from the field will be about 15-20%	14
NU5	Relative Percent Difference is a measure of precision (see above). How about "percent recovery" instead? And need to provide the formula for it's calculation like was done for RPD under the precision section.	RPD is planned as a measure of accuracy when applied to a reference sample. When matrix spikes are added to check for matrix interference, percent recovery will be used as a measure of accuracy. Formula added to text.	15
VAC6	Great! What criteria will there be for these splits?	If analytical results from sample splits exceed two times the field replicate samples the source of the variability will be investigated. It should be noted that USGS and WCD project chiefs anticipate having detailed discussions very early in the sampling process to optimize SOPs so that comparability of the data generated is at the highest practical level.	17

VAC7	This only covers one part of the QC involved Lab analyses should have their own QC table identifying the Measurement Quality Objectives for QC. This should be parsed out by each individual analysis to mirror Table 4.	Table modified. Laboratory control limits are based on the f-psuedosigma meausre of the data generated from control samples which including blanks, continuing calibration standards, and third party reference standards. Dispersion of the measured values of the control samples from the expected concentrations is expressed using the f-psuedosigma, equivalent to the standard deviviation divided by 1.349. See Helsel nd Hirsch. Statisitcal Methods in Water Reosusrces. When continuing control calibration measurements are outside of the control limits, affected analysis are rurun.	18
JC8	Verifying method w/ EPA microbiologists to ensure comparability to other WCD analyses	Noted, see comments below labeled micro1-micro6	
JC9	Are the methods listed the current methods NWQL is performing? Or can they be updated to match the EPA approved methods listed in the 2007 Methods Update Rule? Although not a requirement (no regulatory requirement here) it is always recommended. Overall I want to get as comparable laboratory data as possible for the USGS and WCD data. I noted the method listed in MUR for reference. It is also stated in the comparability section that they will use 40 CFR 136 (i.e., MUR) comparable methods.	Methods listed are current with NWQL. There maybe an issue as NWQL transitions colorametric nitrate reduction analysis from cadmium reduction to nitrate-reductase method.	25
VAC10	Since everything is field filtered, analyses would be more accurately labeled 'dissolved' for clarity.	Using a .45 micron filter is an operational definition of 'dissolved' and should be distinguished from conditions when ions are simply hydrated and truly dissolved. .	

VAC11	Field preserved H2SO4	Acid preservation not required for short, chilled, darkened hold times. See results of QA demonstrations study showing that when biota are removed from samples at collection sites by 0.45-micrometer membrane filtration, subsequent preservation with sulfuric acid or mercury (II) provides no statistically significant improvement in nutrient concentration stability during storage at 4 degrees Celsius for 30 days.Patton and Gilroy 1999, US Geological Survey nutrient preservation experiment : experimental design, statistical analysis, and interpretation of analytical results: USGS WRIR 98-4118	28
JC12	DA = ?	typo	
VAC13	Field preserved 2SO4	Acid preservation not required for short, chilled, darkened hold times, see above comment VAC11	28
JC14	Are potassium and iron being analyzed by difference ICP-AES methods?	yes, different ICP method numbers for cations and metals	25
JC15	Section 4.6.1.2 also lists Total Phosphorus as an analysis. Add to table if correct.	noted and modified	26
VAC16	Missing RUC code (E.coli)	Noted and inserted desigantion for bacteria samples	27
JC17	Preservation of nutrient samples with H2SO4 in field at collection for anlaysis by colorimetric methods is usually required – EPA MUR 2007, 40 CFR 122/136	Acid preservation will disrupt the analysis method used in the NWQL colorametric deterimantion. If acid preservation is required then a different laboratory will be needed. Additional acid preserved splits can be added to sampling plan and sent to accreditied lab as check on sample degradation.	28
JC17	http://www.epa.gov/fedrgstr/EPA-WATER/2007/March/Day-12/w1073.pdf. If this is not standard USGS protocol, could it be done for better comparability to WCD sample data?	Comparability with WCD data will be assessed. Discussions of compara	17
JC18	Figure 3 instead?	Wrong figure number noted and corrected	22

VAC19	The chain of custody form does not include a section for transference of custody.	Sample shipment is handeled under FedEx Shipping Airbill which are signed upon shippiing and receipt. Once received by the lab the Login process opens the cooler measures and records the temperature of the contents of the cool using an infared detector. the record of the receipt, temp, and initials of the person recieving the cooler are recorded on the ASR, a pdf record is attached to the sampleID record and the information is also recorded on the Laboratory information system. see Maloney 2005 for more details	30
JC20	Recommend adding a column for the detection limit (sensitivity) of the instruments, or the calibration ranges.	Column added	31
JC21	Is each sampling event more than one day? Recommend also checking the equipment at the end of each sampling day to verify the parameters are still calibrated and all data logged for the day is valid.	This is done. Text indicates that at the end of the sampling day another cal check is prerform to check for monitoring instruments for drift.	31
VAC22	This is not the method referenced in table 4 (1-1472-87)	USGS analysis method identification for analysis of iron checked on table 4 and text.	34
VAC23	What about other method required QC : Serial dilutions or interference check stds?	A complete description of QC checks is listedfor method I-4471-97 is described in Garbarino, J.R., and Struzeski, T.M., 1998, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory -- Determination of elements in whole-water digests using inductively coupled plasma-optical emission spectrometry and inductively coupled plasma-mass spectrometry: U.S. Geological Survey Open-File Report 98-165, 101 p. QC information generated in the analtycal process is reatined by the laboratory and available on request.	40
VAC24	Micro-related sections are currently out to our Microbiologist at the lab; awaiting comments on procedures and method.	Comments related to bacteria analysis listed below microNU1-microNU6	

JC25	What is the criteria for the blanks? How will blank results be evaluated? What corrective action or data validation will occur if they are outside of the criteria?	Laboratory blank must be less than the long-term method detection limit (LT-MDL); if analysis of blank samples is greater than LT-MDL affected samples will be rerun. Field blanks will be evaluated for sampling contamination, if value exceeds two times the long-term detection limit or is within 10 percent of the mean sample concentration. samples will be flagged as estimated values due blank contamination and efforts will be made to identify and eliminate the source of contamination.	40
VAC26	Needs QC table for lab analyses with acceptance criteria by analysis for the QC listed in this section. (Blanks, MS/MSD, dup, surrogates, etc). While the lab has their determined QC criteria, it needs to be stated in the QAPP what the project goals are so it is a stand-alone document.	nuts, regresion eqn plus/minus 1.5 fpsuedo sigma all sample values must be bracketed by QA data within control limits.	
VAC27	What is released, i.e. what level of deliverables will the lab be providing? If 'levels' are not defined, state in detail what the lab will be providing: data result reports and an analysis narrative? Raw data?	Propriatory data is released to the NWIS database and WaWSC pending final review by project staff	43
VAC28	Who applies data qualifiers? Will any lab qualification occur? What qualifiers are used/definition. U, J, R etc	Data qualifiers can be applieied either at the lab or by project/review personnel.	40
JC29	What about data sharing with WCD and EPA for the entire ARM project? State when / how the data will be provided to other parties and specifically who the contacts are that would be receiving the data. EPA/USGS expectations for data sharing is probably found in the interagency agreement and may be appropriate to state/reference here as well.	Data sharing between USGS and WCD will be o continious process conducted by indiviual project chiefs or their designates. Logistical details of this data sharing will be disscussed and documented at the initialtion of field sampling.	44
VAC 30	Please reference EPA G5/G4 for QAPP guidance and DQO development	noted and done	10

microNU1	Make sure that the samples collected for fecal coliform are collected aseptically and that the other testing mentioned as field screening is not done on just a portion of the pump sample. Preferably, the sample should be collected first for the coliform testing. Will they use an EPA certified lab for the testing? How will they clean or sanitize the sampling device between samples assuming they collect from more than one site during an event? Peristaltic pumps make it easy to just change out the entire tubing with new sterile tubing – hopefully that is their intent.	Aseptic techniques will be used for all micor sampling and equipment and buffer blanks are included as part of all bacteria sampling runs. Much of the micro field techniques are described in chapter 7 of USGS Field Manual which includes such items as not rinsing sample bottle, use of sodium thiosulfate to neutralize bleach used to field sterilize.	32
microNU2	Need to be more specific – the hold time is actually 8 hours for anything that is not drinking water. However, if they wanted to use the 24 hour hold time, they should specify this rather than saying 1 day.	Hold time is 8 hours, although I think our (USGS) guidance is 6hr.	36
microNU3	Doesn't work for microbiology. They should not field rinse the bottle and the bottle should be sterile – hence no field rinsing. PE is usually sterilized using irradiation or gas as it doesn't tolerate the pressure/heat associated with autoclaves. They don't identify the "C" in RUC in this table.. does that mean chilled?	I believe the sample bottles we autoclave are constructed of HDPE. Could sterile Whirl pac bags be used as sample containers for groundwater and wastewater sample collection.	36
microNU4	This could be a big problem unless they ensure that all the chlorine residual is removed from the tubing prior to sample collection. They could neutralize the chlorine by flushing the line with sodium thiosulfate… or just water and then testing the water for chlorine prior to sample collection for bacteria.	sodiium thiosulfate rinse is part of the protocal	32
microNU5	All good stuff. Especially if they make sure that the tubing used for collection is free of chlorine prior to sample collection.	Can check rinse solution with chloine test strips. H	36
microNU6	There will be a difference in results between USGS (E. coli) and Whatcom's fecal coliform testing. Usually (but not always) fecal coliform counts will be higher…..	This is one of the discussion point that are scheduled to be hammered out between WCD and USGS in the early phase of field sampling so that comparability of data is maximized.	36

Curt1	Steve, Here is some language for the criteria for deviating from the target of 4 wells on each parcel and the clear statement that the intention is to install 4 unless some serious technical or agricultural challenge drives you to drop to 3…Since 2 wouldn't allow us to figure out even the flow direction, I just can't consider 2 a reasonable number for this project…	Language was changed to reflect the intent to install 4 wells per plot area.	10
Curt2	Same language as above and rationale	Language was changed to reflect the intent to install 4 wells per plot area.	10
Kozar1	my only major concern is related to the use of packers in the screened interval of the 2-inch wells. I know that you are also somewhat concerned about the potential for cross-contamination within the filter pack of the well.	Use of a very fine grained sand, much finer than the aquifer material to be sampled, will be used in the annular space around the screened portion of the well to mitigate any potential vertical flow from one packed interval to the next.	21
Kozar2	Check performance of the multiple-zone packer assembly to isolate sampling zones.	injection of a fluoromteric tracer in the interval below the lower most packer and sampling of the overlying packed intervals for presence to the tracer will help to verify that the packer assembly is working as designed, and that cross contamination between packers is not occurring or is minimal.	21
Kozar3	minimize the potential for inducing a head change over the multiple-packed intervals.	The low pumping rate (roughly 10 ml/min) should minimize the potential for induced head gradiants betweensampling intervals.	24

Assessment of variability in analytical concentrations

Sequential replicates	Variablity related to sample collection, processing and short term local variability.
Split replicates	Variability related to analytical process
Blank	Identify sample bias/contamination